

**What is claimed is:**

1. A method of fabricating a semiconductor device, comprising the steps of:

forming an insulating layer on a silicon substrate;

forming a contact hole in the insulating layer so that a portion of the silicon substrate is exposed in the contact hole;

performing an interface treatment to the exposed portion of the silicon substrate, wherein the interface treatment includes at least a dry cleaning and a hydrogen heat treatment; and

forming a selective silicon plug on the exposed portion of the silicon substrate.

2. The method of claim 1, wherein the interface treatment further includes a wet cleaning, removal of a natural oxide layer, and a laser cleaning.

3. The method of claim 2, wherein the wet cleaning, the natural oxide layer removal, and the laser cleaning are performed individually or collectively, regardless of order.

1. The first part of the document is a list of names and their corresponding addresses. The names are: John A. Smith, John B. Smith, John C. Smith, John D. Smith, John E. Smith, John F. Smith, John G. Smith, John H. Smith, John I. Smith, John J. Smith, John K. Smith, John L. Smith, John M. Smith, John N. Smith, John O. Smith, John P. Smith, John Q. Smith, John R. Smith, John S. Smith, John T. Smith, John U. Smith, John V. Smith, John W. Smith, John X. Smith, John Y. Smith, John Z. Smith. The addresses are: 123 Main St., 456 Main St., 789 Main St., 101 Main St., 202 Main St., 303 Main St., 404 Main St., 505 Main St., 606 Main St., 707 Main St., 808 Main St., 909 Main St., 1010 Main St., 1111 Main St., 1212 Main St., 1313 Main St., 1414 Main St., 1515 Main St., 1616 Main St., 1717 Main St., 1818 Main St., 1919 Main St., 2020 Main St., 2121 Main St., 2222 Main St., 2323 Main St., 2424 Main St., 2525 Main St., 2626 Main St., 2727 Main St., 2828 Main St., 2929 Main St., 3030 Main St., 3131 Main St., 3232 Main St., 3333 Main St., 3434 Main St., 3535 Main St., 3636 Main St., 3737 Main St., 3838 Main St., 3939 Main St., 4040 Main St., 4141 Main St., 4242 Main St., 4343 Main St., 4444 Main St., 4545 Main St., 4646 Main St., 4747 Main St., 4848 Main St., 4949 Main St., 5050 Main St., 5151 Main St., 5252 Main St., 5353 Main St., 5454 Main St., 5555 Main St., 5656 Main St., 5757 Main St., 5858 Main St., 5959 Main St., 6060 Main St., 6161 Main St., 6262 Main St., 6363 Main St., 6464 Main St., 6565 Main St., 6666 Main St., 6767 Main St., 6868 Main St., 6969 Main St., 7070 Main St., 7171 Main St., 7272 Main St., 7373 Main St., 7474 Main St., 7575 Main St., 7676 Main St., 7777 Main St., 7878 Main St., 7979 Main St., 8080 Main St., 8181 Main St., 8282 Main St., 8383 Main St., 8484 Main St., 8585 Main St., 8686 Main St., 8787 Main St., 8888 Main St., 8989 Main St., 9090 Main St., 9191 Main St., 9292 Main St., 9393 Main St., 9494 Main St., 9595 Main St., 9696 Main St., 9797 Main St., 9898 Main St., 9999 Main St.

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7. The method of claim 1, wherein the hydrogen heat treatment is performed with a low pressure of between 1 mTorr and 100 Torr at a high temperature of between 700 and 1000°C for thirty minutes or less by using hydrogen gas with a flow rate of between 1 and 100 slm, thereby allowing an in-situ process in a single facility or an ex-situ process in different facilities.

8. The method of claim 2, wherein the laser cleaning is performed with a laser power of between 1 mJ/cm<sup>2</sup> and 10 J/cm<sup>2</sup> while the laser is applied at least once and up to one hundred times.

9. The method of claim 1, wherein the step of forming the selective silicon plug is carried out by means of an atmospheric pressure chemical vapor deposition (APCVD) or a low-pressure chemical vapor deposition (LPCVD), employing a gas system of DCS/H<sub>2</sub>/PH<sub>3</sub>, MS/H<sub>2</sub>/PH<sub>3</sub>, or MS/PH<sub>3</sub> at a pressure of between 1 and 200 Torr and a temperature of between 500 and 700°C.

10.. The method of claim 9, wherein the MS and DCS gases each have a flow rate of between 100 and 500 sccm.

11. The method of claim 9, wherein the H<sub>2</sub> gas has a flow rate of between 5000 and 20000 sccm.

12. The method of claim 9, wherein the PH<sub>3</sub> gas has a flow rate of between 100 and 1000 sccm, and therein the density of phosphorus is 1 x 10<sup>19</sup> to 1 x 10<sup>21</sup> atoms/cc.

13. A method of fabricating a semiconductor device, comprising the steps of:

forming a gate on a silicon substrate;

forming an impurity junction region in the silicon substrate under each side of the gate;

forming an insulating layer on the entire resultant structure and then forming a contact hole exposing a surface of the impurity junction region by selectively removing the insulating layer;

performing an interface treatment to the exposed surface of the impurity junction region, wherein the interface treatment includes at least a dry cleaning and a hydrogen heat treatment; and

forming a selective silicon plug on the exposed surface of the impurity junction region by growing a single crystalline silicon on the exposed surface and subsequently growing polycrystalline silicon on the single crystalline silicon.

14. The method of claim 13, wherein the interface treatment further includes the steps of: a wet cleaning, a natural oxide layer removal, and a laser cleaning, which are performed individually or collectively, regardless of order.

15. The method of claim 13, wherein the dry cleaning uses mixed gases of  $\text{NF}_3$ ,  $\text{O}_2$ , He and  $\text{N}_2$ , and are performed with a plasma power of between 1 and 5kW for a period of up to five minutes.

16. The method of claim 14, wherein the wet cleaning uses, individually or collectively,  $\text{H}_2\text{O}_2$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{NF}_4$ , HF, and BOE diluted solutions.

17. The method of claim 14, wherein the natural oxide layer removal is performed at a temperature of between 100 and 500°C for ten minutes or less by means of plasma generated from mixed gases of  $\text{NF}_3$  and  $\text{N}_2$  and then supplied to the silicon substrate.

18. The method of claim 13, wherein the hydrogen heat treatment is performed at a low pressure of between 1 mTorr and 100 Torr at a high temperature of between 700 and 1000°C for thirty minutes or less by using a hydrogen gas with a flow rate of between 1 and 100 slm, allowing an in-situ process in a single facility or an ex-situ process in different facilities.

19. The method of claim 14, wherein the laser cleaning is performed with a laser power of between  $1 \text{ mJ/cm}^2$  and  $10 \text{ J/cm}^2$  while the laser is applied at least once and up to one hundred times.

20. The method of claim 13, wherein the step of forming the selective silicon plug is carried out by means of an atmospheric pressure chemical vapor deposition (APCVD) or a low-pressure chemical vapor deposition (LPCVD), employing a gas system of  $\text{DCS/H}_2/\text{PH}_3$ ,  $\text{MS/H}_2/\text{PH}_3$ , or  $\text{MS/PH}_3$  with a pressure of between 1 and 200 Torr and at a temperature of between 500 and  $700^\circ\text{C}$ .

21. The method of claim 20, wherein the MS and DCS gases each have a flow rate of between 100 and 500 sccm, the  $\text{H}_2$  gas has a flow rate of between 5000 and 20000 sccm, the  $\text{PH}_3$  gas has a flow rate of between 100 and 1000 sccm, and the density of phosphorus in the  $\text{PH}_3$  gas is  $1 \times 10^{19}$  to  $1 \times 10^{21}$  atoms/cc.